



# COLORADO ENVIRONMENTAL PESTICIDE EDUCATION PROGRAM

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## USING INSECT REPELLENTS SAFELY

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This fact sheet describes how to choose insect repellents, and discusses common repellents available to consumers, including DEET, permethrin, and botanical products.

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## Using Insect Repellents Safely

Mosquitoes, biting flies, and ticks can be annoying and sometimes pose a serious risk to public health. In Colorado, mosquitoes can transmit diseases such as West Nile Virus. Biting flies can inflict a painful bite that can persist for days, swell, and become infected. Ticks can transmit serious diseases like Lyme disease and Rocky Mountain spotted fever. When properly used, insect repellents can discourage biting insects from landing on treated skin or clothing.

### Choosing Insect Repellents

Insect repellents are available in various forms and concentrations. Aerosol and pump-spray products are intended for skin applications as well as for treating clothing. Liquid, cream, lotion, spray, and stick products enable direct skin application.

All insecticides must have the name and amount of active ingredient on the label. Products with a low concentration of active ingredient may be appropriate for situations where exposure to insects is minimal. Higher concentration of active ingredient may be useful in highly infested areas or with insect species which are more difficult to repel.



Whenever you use an insecticide or insect repellent, be sure to carefully read and follow the manufacturer's "Directions for use," as printed on the pesticide product label (see Pesticide Fact Sheet [The Pesticide Label](#)). No pesticide is 100% safe and care must be exercised in the use of any pesticide. Where appropriate, consider nonchemical ways to deter biting insects—screens, netting, long sleeves, and slacks.

Repellents commonly available contain the active ingredients DEET (N,N-diethyl-m-toluamide), permethrin, or botanical oils.

## **DEET**

For more than 40 years, DEET has been the standard in mosquito repellents. It is used to repel biting pests such as mosquitoes and ticks and is designed for direct application to human skin to repel insects, rather than kill them. DEET concentrations range from a low of about 5% up to 100%. Skin reactions (particularly at DEET concentrations of 50% and above) and eye irritation have been the most frequently reported adverse effects. The use of DEET products primarily results in exposure from skin contact, although unintentional exposure by breathing and ingestion can also occur.

By using products with lower concentrations of DEET and by applying as little of the product as needed for your outdoor activities, you can reduce your exposure to DEET. The American Academy of Pediatrics recommends that repellents used on children contain no more than 10% DEET.

DEET products can be applied to clothing, but may damage some synthetic fabrics and plastics, especially products with very high DEET concentrations. Launder treated clothing separately from other clothing (see Pesticide Fact Sheet [Handling Pesticide Tainted Clothing](#)). Frequent reapplication or saturation is unnecessary for effectiveness. Use only what is required to maintain protection. Read the product label for reapplication instructions.

Do not use DEET products on dogs unless it is the dilute form for children. Do not use DEET on cats.

## **Permethrin Products**

Permethrin is highly effective as a repellent. Permethrin kills insects that come in contact with treated clothes. Permethrin-containing repellents are recommended for use on clothing, shoes, and camping gear. Permethrin repellents do not offer any protection from mosquitoes when applied to the skin. If permethrins are not used according to label directions they can cause eye irritation.

Some recommendations for proper use are:

- Treat clothing only—DO NOT apply to skin
- Read carefully and follow manufacturer's recommendations for application
- Apply to outer surface of clothing and shoes in a well-ventilated outdoor area, protected from wind
- Only spray enough product to lightly moisten the outer surface of the fabric, causing a slight color change or darkening; do not saturate clothing
- Hang the treated clothing outdoors and allow to dry for at least two hours before wearing
- Do not treat unwashed clothing more than once every two weeks
- Launder treated clothing separately from other clothing at least once before retreating
- If you accidentally get the product on your skin, immediately wash with soap and water

## **Botanical Products**

Insect repellent products containing botanical (plant-based) oils, such as oil of geranium, cedar, lemongrass, soy, or citronella are also available. There is limited information on the effectiveness of botanical oils individually or when combined with other ingredients to make repellent products. Available information, however, indicates that compared to the effectiveness of DEET or permethrin, botanical oils generally do not provide the same duration of protection. Because many botanical oils are regulated differently than DEET and permethrin, most have not been tested for their potential to cause short- or long-term toxic or reproductive effects, birth defects, or cancer.

## **Using Insect Repellents Safely**

The [Environmental Protection Agency](#) (EPA) recommends the following precautions when using insect repellents:

- Apply repellents only to exposed skin and/or clothing as directed on the product label. Do not use under clothing
- Never use repellents over cuts, wounds, or irritated skin
- Do not apply to eyes and mouth, and apply sparingly around ears. When using sprays, do not spray directly onto face; spray on hands first and then apply to face
- Do not allow children to handle the products, and do not apply to children's hands. When using on children, apply to your own hands and then put it on the child
- Do not spray in enclosed areas. Avoid breathing a repellent spray, and do not use it near food
- Use just enough repellent to cover exposed skin and/or clothing. Heavy application and saturation is generally unnecessary for effectiveness; if biting insects do not respond to a thin film of repellent, then apply a bit more
- After returning indoors, wash treated skin with soap and water or bathe. This is particularly important when repellents are used repeatedly in a day or on consecutive days. Also wash treated clothing before wearing it again

## **Important Information on Using Pesticides**

- Read the entire label before using a pesticide. Even if you have used it before, read the label again—do not trust your memory (See Pesticide Fact Sheet [Reading Pesticide Labels](#)).
- Follow directions for use carefully, use only the amount directed, at the time and under the conditions specified, and for the purpose listed. For example, if you need a tick repellent, make sure that the product label lists this use. If ticks are not listed, the product may not be formulated for that use.
- Store pesticides away from children's reach, in a locked utility cabinet or garden shed (See Pesticide Fact Sheet [Proper Pesticide Storage](#)).

## **In Case of Emergency**

Using any of these repellents is not without risk of adverse reactions, especially if used in large amounts or applied improperly. If you suspect that you or a child is reacting to a repellent, wash the skin that has been in contact with the repellent, remove any treated clothing, and call your doctor or the [Rocky Mountain Poison and Drug Center](#) (1-800-222-1222). If you go to the doctor, take the repellent with you (See Pesticide Fact Sheet [First Aid for Pesticide Poisoning](#)).

## **References and Resources**

*Health Advisory: Tick and Insect Repellents.* <http://www.health.state.ny.us/nysdoh/westnile/education/2737.htm>  
New York State Department of Health, Albany, New York.

*How to use Insect Repellents Safely.* <http://www.epa.gov/pesticides/factsheets/insectrp.htm> US Environmental Protection Agency, Office of Pesticide Programs, Washington, D.C.

National Pesticide Information Center <http://npic.orst.edu/> (NPIC).

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